

Traceability *Matrix*

User's Manual



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About the Traceability Matrix

The Traceability Matrix is an electronic database of cross-references between three range safety documents: the FAA's proposed Part 417, the Air Force's EWR 127-1, and the Air Force's AFSCMAN 91-710. The purpose of the matrix is to allow a user to input a section number from any one of those documents, to which the program will return cross-references (if they exist) from the other two. The program **does not** currently allow the user to search for sections based on a specific text. The underlying assumption is that the user is intimately familiar with at least one of the three documents, and knows the section numbers of interest.

The Traceability Matrix was created as a merger of two independent efforts between the Air Force and Commercial Space Transportation (AST). Due to different choices made in resolution, document breakdown, and formatting, in addition to errors introduced by typos, missing information, and computer glitches, the Traceability Matrix should not be considered the final authority on document linking. Additionally, several requirements in the proposed 417 were derived from areas other than EWR 127-1 (such as range practice and range guidelines), and therefore are not directly linked in the matrix to 127-1. The bottom line is a missing cross-reference in the matrix does not necessarily mean that the documents or practices are not in agreement on a particular topic. The user is strongly advised to seek out the expert opinions of both AST and AF engineers most familiar with a topic before coming to conclusions on their consistency or lack thereof.

Starting the Traceability Matrix

Step 1 – Download the Matrix

Currently, the matrix is available as a download from this webpage:
<http://ast.faa.gov/UM/index.htm>

Step 2 – Uncompress the file

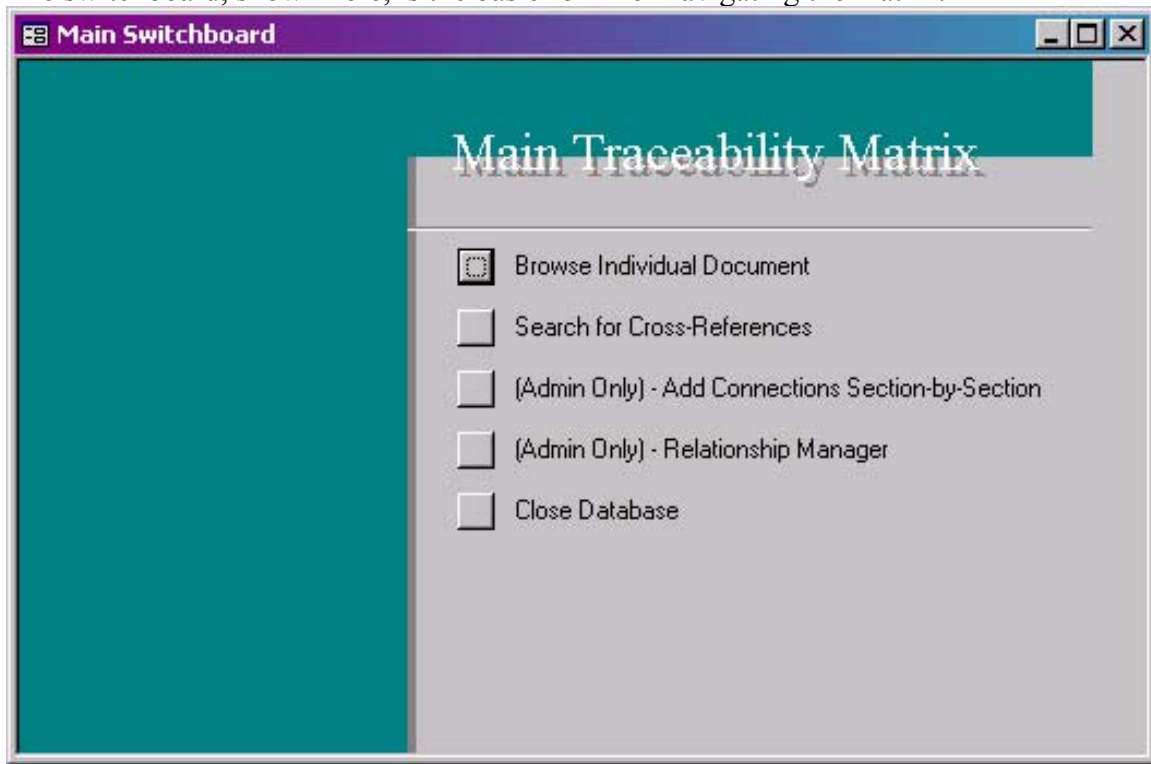
The file is compressed as a ZIP file. To start, uncompress the file (using WinZip or some other utility) into a directory of your choice.

Step 3 – Start the Matrix

You will need Microsoft Access to run the matrix. Double-click the file to open it in MS Access, and you will be shown the Disclaimer. Click "Ok" on the Disclaimer to reach the Main Switchboard.

The Main Switchboard

The switchboard, shown here, is the basic form for navigating the matrix.



The form contains five buttons. Their names and functions are listed below:

- *Browse Individual Document* – Opens the Browse Form
- *Search for Cross-References* – Opens the Search Form
- *(Admin Only) – Add Connections Section-by-Section* – Opens the Add Connections Form
- *(Admin Only) – Relationship Manager* – Opens the Relationship Manager Form
- *Close Database* – Closes the Traceability Matrix

The Browse Form

The Browse Form (shown below with options labeled) allows users to browse each document section-by-section. The button functions are detailed below:

The screenshot shows a window titled "Browse Documents". On the left, a "Choose a Document" section contains three buttons labeled "417", "127-1", and "91-710", with a red circle "1" next to the "127-1" button. To the right of this is a "Section:" dropdown menu showing "--" with a red circle "2" next to it. Below the "Section:" dropdown is a "Text:" label and a large text area containing "N/A". Above the text area are four navigation buttons: a double left arrow, a single left arrow, a single right arrow, and a double right arrow, with a red circle "3" below them. Below the navigation buttons are two buttons: "Print Section" (with a red circle "4") and "Close Form" (with a red circle "5"). At the bottom of the window, a status bar shows "Record: 1 of 1020" with navigation icons.

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| 1 | This group of buttons allows the user to select which document he or she wants to browse. |
| 2 | The current section number is displayed here. Additionally, the user may manually type in a section number to jump straight to that section. |
| 3 | This group of buttons navigates through the various sections of a document. |
| 4 | This button allows the user to print the current section displayed. Printing of multiple sections is not possible in this version of the matrix. |
| 5 | This button closes the Browse Form, and returns the user to the Main Switchboard. |





The Search Form

Generally considered to be the “heart” of the program, the Search Form will display both the section numbers and text of linked sections. A screenshot of the form (with numbers added for explanation purposes) is shown below.

The screenshot shows a window titled "Search for Cross-References". It contains the following elements:

- Step 1:** "Choose a base document." with buttons labeled 1, 417, 127-1, and 91710.
- Step 2:** "Choose a section from the list below or scroll through all using the buttons." This section includes navigation buttons (left arrow, right arrow, double left arrow, double right arrow) labeled 2, a text box containing "E417.1 (c)" labeled 3, and a "Total Crossreferences to this Section:" field showing the number "1".
- Step 3:** "Compare the text" with three side-by-side text boxes labeled 6, 4, and 5. Each box contains text from a different document (E417.1 (c), 4B.4., and V4-4.3. respectively).
- At the bottom, there are three buttons: "Close Form" (labeled 6), "Print all Cross-References to E417.1 (c)" (labeled 4), and "Print Summary of ALL Cross References" (labeled 5).
- A blue note box on the right states: "Please note that there are usually multiple cross-references to a particular section. Each will have it's own entry in the list."

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| <p>1</p> | <p>The first group of buttons allows the user to choose his or her “base” document. The base document can also be considered the “input document,” in that the user must input a section from this document for the matrix to return the sections of the other two. The base document is generally the document with which the user is most familiar.</p> |
| <p>2</p> | <p>This set of buttons and the text box control the navigation of cross-references. Buttons 1 and 4 will move the user to the previous/next section, whereas Buttons 2 and 3 will move to the previous/next cross-reference.</p> <p>Notes:</p> <ul style="list-style-type: none"> • If the user can not find a section in the list, it is because no direct links exist for that section. • The blue number to the right of the text box displays the total amount of links to a particular section. • If a link only exists between two of the three documents, a placeholder “-” will be displayed for the unlinked document. |

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|  | <p>These three displays will show the various texts of the documents. The far left box shows 417 sections, the middle – 127-1, and the right – 91-710. If a link only exists between two of the three documents, a placeholder “--“ will be displayed for the unlinked document.</p> <p>Notes: If the text is longer than the box will display, do not use the mouse's scroller to view the text. The scroller can only be used to navigate sections. Instead, to view the text, click-and-drag the mouse down (highlighting the text) in order to force a scroll.</p> |
|  | <p>This button will change as the section numbers change. The button will compile and display for printing a list of all the cross-references (and text) to the current section.</p> |
|  | <p>This button will display for printing a summarized listing of all cross-references.</p> |
|  | <p>This button will close the Search Form and return the user to the Main Switchboard.</p> |

The Add Connections Form – Admin Only

This form can be used to create new cross-references, and is generally not needed by the user (unless he or she is customizing the database). The form, with labels, is shown below. The base document is loaded into the topmost space, with the remaining documents loaded into the subdocument sections (3/4 and 5/6). Cross-references are generated by selecting sections from the subdocuments that match the base document.

Section-by-Section Crosslinking Form

Choose Main Set: 417, 127-1, 91710

Baseline: 417

Section: 417.233 (c) | Next Section | Previous Section

Text: (c) Include a wind weighting analysis that establishes the launcher azimuth and elevation settings that correct for the windcocking and wind-drift effects on the unguided suborbital launch vehicle.




CrossLinks to 127 Please note: Matching X-ref Numbers indicate crosslinks between these bottom 2 documents.

| X-ref Number | section | text |
|--------------|-----------|---|
| 3195 | 2.8.2.3c. | Launcher adjustment curve or launcher tilt effect to correct the launcher in azimuth and elevation for wind effects. A discussion of methods to be employed in adjusting the launcher settings to compensate for winds is required. This data is required only if the Range User desires to adjust the launcher azimuth and elevation to correct for wind effects and shall be supplied for all desired resultant QEs. Wind compensation minimizes the area clearance problem by maintaining a constant impact point. A thorough description of the correction method and the expected accuracies to be achieved are required in addition to the proper |
| [AutoNumber] | | |

CrossLinks to 91710

| X-ref Number | section | text |
|--------------|-------------------|---|
| 3195 | V2-3.1.2.3.2.3.3. | Launcher adjustment curve or launcher tilt effect to correct the launcher in azimuth and elevation for wind effects. A discussion of methods to be used in adjusting the launcher settings to compensate for winds is required. This data is required only if the Range User desires to adjust the launcher azimuth and elevation to correct for wind effects and shall be supplied for all desired resultant QEs. Wind compensation minimizes the area clearance problem by maintaining a constant impact point. A thorough description of the correction method and the expected accuracies to be achieved are required in addition to the proper |
| [AutoNumber] | | |

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| 1 | This set of buttons allows selection of a base document. The remaining documents will automatically load into sections 3/4 and 5/6. For example, if 417 is chosen (as shown), 127-1 and 91-710 will be loaded as subdocuments in sections 3/4 and 5/6. |
| 2 | After choosing a base document, section numbers and text should populate the boxes here. The user may type in a section to jump to that section, or may use the buttons provided to scroll through sections one at a time. |
| 3 | Cross-Reference Number: This number, unique to each cross-reference, is used to determine linking between the subdocuments. If a cross-reference number appears in both documents, then they are connected to each other, as well as to the base document. For example, in the screenshot shown, 417.233 (c) at the top |

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| | is connected to both section 2.8.2.3c. in 127-1, and section V2-3.1.2.3.2.3.3. in 91-710. |
|  | To add a new cross-reference, go to the blank section shown here. This section should have the word “(Autonumber)” in the cross-reference box. Entering the cross-referenced section here will change the “AutoNumber” to an actual number, and the text of that section should appear on the righthand side for verification. This section is now connected with the base document. |
|  | This section is identical to section 3, except that it applies to the 2 nd subdocument. |
|  | This section is identical to section 4, except that it applies to the 2 nd subdocument. |

The Relationship Manager Form – Admin Only

This form is used to modify, create, and delete cross-references. Because no text is displayed in this form, the cross-references can be displayed in a table that is easy to read and modify. However, care must be taken, as mistakes on this form are difficult to catch. It is generally advised that this form be used in conjunction with the Browse form. The Relationship Manager Form, with labels, is shown below.

The screenshot shows the 'Relationship Manager' window. At the top, there are three blue labels: '417 Section', '127 Section', and '91710 Section', each with a red circle and the number '1' next to it. A yellow tooltip above the first label says 'Click on a label to sort alphabetically'. Below these labels is a table with five rows. Each row has three dropdown boxes. The first dropdown box in each row contains '417.303 (I)'. The second dropdown box contains '4.8.7.2.', '7.7.4a.', '4.8.8.3.1.', '4.8.5b.', and '4.8.8.4.1a1.' respectively. The third dropdown box contains '--', '--', 'V3-13.5.5.10.', 'V4-4.28.1.', and 'V3-13.5.6.3.1.1.' respectively. To the right of each row is a red 'X' button with a red circle and the number '3' next to it. At the bottom of the window, there are two buttons: 'Close Form' with a red circle and the number '5' next to it, and 'Print Relationships' with a red circle and the number '4' next to it.

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| 1 | The top section consists of three blue labels, each of which will sort the table alphabetically when clicked. |
| 2 | Each row contains dropdown boxes with section numbers from the documents. Each row in its entirety is considered a cross-reference. If a cross-reference between only two documents is desired, a placeholder "--" may be input for the third document (as shown in the topmost row of the example screenshot). |
| 3 | This button will delete the cross-reference (row) next to it. |
| 4 | This button will print a summary of the cross-references. You may only want to do this once, as it is quite a large printout. |
| 5 | This button closes the form. |

Known Bugs

Bug Number: B-001

Location(s): Search Form

Description: Database does not load completely, causing the selected cross-reference to appear to have a lower total number of cross-references than it should.

Workaround: The current workaround is to type in the final cross-reference. This forces Access to load the final cross-reference and all the cross-references that come before it (which is the whole database). Therefore, it is advisable that, before searching for cross-references, the user type in the last cross-reference for the base document he or she is using. The last cross-references are:

- 417 – “Table I417-4”
- 127-1 – “Table 4B9-3”
- 91-710 – “V7-1.2.6.28”

Bug Number: B-002

Location(s): All input forms.

Description: On some computers, when the user types in a section which contains the phrase “(c)”, MS Access will AutoCorrect the (c) into a ©, and then be unable to find the cross-reference.

Workaround: To stop this from happening, please disable the AutoCorrect feature in Access by going to Tools menu and choosing AutoCorrect. Uncheck the box that says “Replace text as you type” (see below).

